PHYSICO-CHEMICAL PROPERTIES OF NEW ZEALAND CHESTNUT FLOUR FROM DIFFERENT PROCESSING METHODS

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ABSTRACT

Chestnuts are relatively new nut crop to New Zealand (NZ), growing well in local conditions. Physico-chemical properties of NZ chestnut flours obtained through dry milling (DC), wet milling (WC) and freeze-drying (FC) methods were investigated to understand their potential utility in food industry. All chestnut flours showed significantly higher solubility (S>38% at 70°C) and swelling power (SP>64% at 70°C), lower moisture content MC<4%), and higher stability against heat and mechanical treatment compared to wheat (S=9.5%, SP=43.2%, MC=11.1%) and corn flour(S=4.4%, SP=38.4%, 14.1%). All chestnut flour samples showed slightly higher pH values (DC, WC=6.3; FC=6.4) compared to corn (5.9) and wheat (6.0). DC showed highest syneresis at day 4 (90.1%±0.4) followed by WC (86.0%±0.6), wheat flour (85.5%±0.2), and corn flour (83.0%±1.5), while FC showed the lowest syneresis of 81.7%±0.3). WC had highest bulk density (0.921g/ml), and FC had lowest (0.799g/ml). Paste clarity was <1% of light transmittance (650nm) for all flour types. Chestnut starch granules were oval shaped, FC were smallest in size (<2.5 µm) and DC and WC were size of 5.0-7.5 µm. All chestnut flours exhibited apparent shear thinning behaviour. DC had the lowest viscosity (peak=811cP, final=1015cP) and FC had the highest (peak=3263cP, final=1587cP). The results of this study support the potential utility of NZ chestnut flour as a thickening agent substitute to corn flour.

Keywords: Physico-chemical properties, chestnut flour

Highlights (maximum 85 characters, including spaces, per bullet point):

1. Core finding: Chestnut flour has higher solubility, swelling power, stability and lower moisture
2. Core finding: Chestnut flour has shear thinning behaviour in suspensions
3. Industrial relevance: There are many potential applications of NZ chestnut flour in food industry